REMARKS

In response to the Office Action mailed July 13, 2005, Applicant respectfully requests reconsideration. Claims 1-19, 35, 37-69 and 71-87 are currently pending in this application. Claims 1, 2, 73, 76, and 79 are amended herein and the application as presented is believed to be in condition for allowance.

Rejections Under 35 U.S.C. §112

In paragraph 5, the Office Action rejects claims 79-81 under 35 U.S.C. §112, second paragraph, asserting that there is insufficient antecedent basis for the term "said rate sensor" in claim 79. Applicant has amended claim 79 to address this issue. Accordingly, it is respectfully requested that the rejection of claim 79 under 35 U.S.C. §112, second paragraph be withdrawn.

Rejections Under 35 U.S.C. §102

In paragraph 7, the Office Action rejects claims 1, 5, 6, 12-19, 69, 73, and 77 under 35 U.S.C. §102(e) as purportedly being unpatentable over Puttkammer (U.S. Patent Application Publication No. 2004/0012773). In view of the amendments made herein to claims 1 and 73, Applicant respectfully disagrees with this rejection.

Specifically, Applicant has amended claims 1 and 73 to require that a finger or features of a fingerprint passing over the sensor gaps produce a change in capacitance. Puttkammer does not disclose or suggest a finger producing a change in capacitance between respective transmitting electrodes 9 and receiving electrode 10 in scanner 8. Rather, Puttkammer is directed to using the scanner 8 to detect electrically conductive printing dyes on documents. *See* Puttkammer, paragraph 23.

Thus, independent claims 1 and 73 patentably distinguish over Puttkammer. Accordingly, it is respectfully requested that the rejection of claims 1 and 73 under 35 U.S.C. §102(e) be withdrawn.

Claims 2-19 and 69 depend from claim 1 and claims 74-78 depend from claim 73. Each of these claims is patentable over Puttkammer for at least the reasons discussed above in

connection with the independent claim from which it depends. Accordingly, it is respectfully requested that rejection of these claims under 35 U.S.C. §102(e) be withdrawn.

Rejections Under 35 U.S.C. §103

Rejections over Puttkammer and Raynal

The Office Action rejects claims 2-4, 7-9, 67, 74, 76, 78, and 82-86, of which claims 67, 82, and 84 are independent, under 35 U.S.C. §103(a) as purportedly being obvious over Puttkammer in view of Raynal (6,643,389). Applicant respectfully disagrees with this rejection, as the combination of Puttkammer and Raynal is improper. Further, even if one were to combine Puttkammer and Raynal in the manner suggested in the Office Action, independent claims 67, 82, and 84 patentably distinguish over any such combination.

As discussed below in greater detail, it is Applicant's understanding that the Examiner believes one of skill in the art would have been motivated, based on the teachings of Raynal, to modify the scanner of Puttkammer to scan fingerprints instead of documents (though Applicant believes this combination of references is improper). Applicant appreciates that, in view of the amendments to claims 1 and 73 requiring that a finger or features of a finger passing over the sensor gaps produce a change in capacitance (as opposed to any object), the Examiner may assert that claims 1 and 73 are obvious over the combination of Puttkammer and Raynal. For the purposes of expediting prosecution of this application and to obviate the need for the Examiner to make this rejection in a subsequent Office Action, Applicant, in addition to responding to rejection of the claims listed above, explains below why a rejection of claims 1 and 73 as being obvious over Puttkammer and Raynal would be improper (even though such a rejection has not yet been made).

The Combination of Puttkammer and Raynal Is Improper

At paragraph 9, The Office Action asserts that, "Puttkammer and Raynal are combinable because they are from the same art of image sensing through the use of image pickup and drive plates used to determine a change in capacitance. At the time of the invention, it would have

been obvious to a person of ordinary skill in the art to space and dimension the image pick [*sic*] plate and the image drive plates as disclosed by Puttkammer for sensing a fingerprint as taught by Raynal." It is Applicant's understanding that the Examiner asserts that it would have been obvious to modify the teachings of Puttkammer, based on Raynal, to use the scanner disclosed by Puttkammer (i.e., scanner 8) to sense fingerprints, rather than using the scanner for documents having electrically conductive printing dyes as taught by Puttkammer. Applicant respectfully disagrees.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify a reference or to combine reference teachings. *See* MPEP, §2142, page 2400-128, Original Eighth Edition, Rev. 2, May 2004.

There is no teaching or suggestion in Puttkammer to use the scanner (i.e., scanner 8) for scanning fingerprints. Puttkammer only teaches using the scanner to scan documents imprinted with a conductive printing dye. The scanner of Puttkammer has a plurality of transmitting electrodes 9 and one receiving electrode 10, as shown in Figures 1, 3, and 4.

While Raynal relates to detecting fingerprints using an array of capacitive sensing elements, Raynal teaches that each cell of the array has two conductor plates and that when a finger is placed on a cell of the array, the change in capacitance between the two conductor plates is measured. It should be appreciated that a system having a plurality of transmitting electrodes and a single receiving electrode (as taught by Puttkammer) is very different from a system having an array of cells, wherein each cell of the array includes two conductors (as taught by Raynal). Raynal teaches only that a two-dimensional array of cells, wherein each cell includes two conductors, may be used to detect fingerprints. Nowhere does Raynal teach or suggest that other capacitive scanners with different configurations may be used to scan fingerprints. Rather, Raynal only teaches that the specific detection system disclosed therein may be used to scan fingerprints.

In addition, to establish a *prima facie* case of obviousness, there must be a reasonable expectation of success of the proposed modification or combination. **The reasonable**

expectation of success must be found in the prior art and may not be based on Applicant's disclosure. *See* MPEP, §2142, page 2400-128, Original Eighth Edition, Rev. 2, May 2004.

There is no disclosure or suggestion in either reference that using the scanner of Puttkammer to scan fingerprints would be successful. As discussed above, Raynal discloses that using a scanner having an array of cells, where each cell has two conductors, would work to scan fingerprints, but does not disclose that scanner of Puttkammer, which has a very different configuration, would work to detect fingerprints. In addition, Puttkammer only discloses that the scanner disclosed therein would work for scanning documents printed with conductive dyes. Puttkammer does not disclose that this scanner would work for detecting fingerprints.

Further, scanning electrically conductive dyes is very different from scanning fingerprints. That is, the electrical properties of a finger (i.e., human tissue) are very different from the electrical properties of conductive ink or dye. Thus, one of skill in the art would not have assumed that, because the scanner of Puttkammer is suitable for scanning electrically conductive dyes, that such a scanner would be capable of scanning fingerprints.

One of skill in the art would not have been motivated to modify Puttkammer to scan fingerprints instead of documents. Further, such a modification would not have been successful. Thus, the combination of Puttkammer and Raynal is improper. Accordingly, it is respectfully requested that the rejection of claims 2-4, 7-9, 67, 74, 76, 78, and 82-86 under 35 U.S.C. §103 as purportedly being obvious over Puttkammer in view of Raynal be withdrawn.

The Claims Patentably Distinguish Over The Combination

Assuming, *arguendo*, that one of skill in the art would have been motivated to combine the teachings of Puttkammer with Raynal to use the scanner of Puttkammer to scan fingerprints instead of documents and assuming that such a modification would be successful, independent claims 73, 84, and 87 patentably distinguish over the combination.

Claim 73

Claim 73, as amended, is directed to a capacitive sensor comprising: a pickup plate; and a plurality of drive plates in spaced relation to said pickup plate to define an array of sensor gaps

between respective drive plates and said pickup plate, said pickup plate and said plurality of drive plates being substantially coplanar, wherein a finger passing above said array of sensor gaps produces a change in capacitance between respective drive plates and said pickup plate.

Neither Puttkammer nor Raynal discloses or suggests that the pickup plate and the plurality of drive plates are substantially coplanar. Raynal does not even disclose a sensor having a pickup plate and a plurality of drive plates, and therefore necessarily does not disclose that these components are coplanar. The Office Action asserts that Figure 3 of Puttkammer discloses this limitation. *See* Office Action, page 6. Applicant respectfully disagrees.

Figure 3 of Puttkammer is a top view of the scanner. Thus, Figure 3 indicates how the transmitting electrodes and the receiving electrode are positioned relative to each other in the *x*- and *y*-dimensions, but indicates nothing about how these electrodes are positioned relative to each other in the *z*-dimension. Therefore, it cannot be determined from Figure 3 whether the transmitting electrodes and the receiving electrode are substantially coplanar.

Nowhere does Puttkammer disclose or suggest that the transmitting electrodes and the receiving electrode are substantially coplanar. Raynal does not cure this infirmity of Puttkammer. Thus, claim 73 patentably distinguishes over Puttkammer and Raynal, whether taken alone or in combination. Claims 74-78 depend from claim 73 and are patentable for at least the same reasons.

Claim 82

Claim 82 is directed to a fingerprint sensing apparatus comprising: an image sensor comprising an image pickup plate disposed generally laterally with respect to a direction of movement of a finger; and a plurality of image drive plates in spaced relation to said image pickup plate to define a plurality of sensor gaps between respective image drive plates and said image pickup plate, wherein said image pickup plate and said plurality of image drive plates are fabricated on a substrate; and a sensor circuit, separate from said substrate, for excitation of said image sensor with image drive signals and for detection of image signals generated by said image sensor in response to said image drive signals.

Neither Puttkammer nor Raynal discloses or suggests that the sensor circuit is separate from the substrate on which the image drive plates and image pickup plate are fabricated. The Office Action does not identify which reference is purported to disclose this limitation and, indeed, this limitation cannot be found in either reference.

While the Office Action asserts that Puttkammer discloses a sensor circuit in Figure 2, there is no disclosure or suggestion in Puttkammer that this purported sensor circuit is separate from the substrate on which the image drive plates and image pickup plate are fabricated. Indeed, Puttkammer is completely silent as to whether any of the components are fabricated on the same substrate or on different substrates. Raynal does not cure this infirmity of Puttkammer.

Thus, claim 82 patentably distinguishes over Puttkammer and Raynal, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 82 under 35 U.S.C. §103(a) be withdrawn.

Claim 83 depends from claim 82 and is patentable for at least the same reasons. Accordingly, it is respectfully requested that the rejection of claim 83 under 35 U.S.C. §103(a) be withdrawn.

Claim 84

Claim 84 is directed to a fingerprint sensor comprising: a substrate; an image pickup plate fabricated on said substrate and disposed generally laterally with respect to a direction of movement of a finger; and a plurality of image drive plates fabricated on said substrate in spaced relation to said image pickup plate to define a plurality of sensor gaps between respective image drive plates and said image pickup plate.

Neither Puttkammer nor Raynal discloses or suggests that the image pickup plate and the image drive plates are fabricated on the same substrate. The Office Action does not identify which reference is purported to disclose this limitation and, indeed, it cannot be found in either reference. As discussed above, Puttkammer is completely silent as to on what substrate the transmitting electrodes 9 and the receiving electrode 10 are fabricated. There is simply no disclosure in Puttkammer that these components are fabricated on the same substrate. Raynal does not cure this infirmity of Puttkammer.

Thus, claim 84 patentably distinguishes over Puttkammer and Raynal, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 84 under 35 U.S.C. §103(a) be withdrawn.

Claims 85-87 depend from claim 84 and are patentable for at least the same reasons. Accordingly, it is respectfully requested that the rejection of these claims under 35 U.S.C. §103(a) be withdrawn.

Rejections over Tschudi and Puttkammer

The Office Action rejects claims 35, 39, 40, 45-51, 64, 68, and 71, of which claims 35 and 67 are independent, under 35 U.S.C. §103(a) as purportedly being obvious over Tschudi (6,785,407) in view of Puttkammer. Applicant respectfully disagrees with this rejection, as the combination of Tschudi and Puttkammer is improper. Further, even if one were to combine Tschudi and Puttkammer in the manner suggested in the Office Action, independent claims 67, 82, and 84 patentably distinguish over any such combination.

The Combination of Tschudi and Puttkammer Is Improper

The Office Action asserts that, "[a]t the time of the invention, it would have been obvious to a person of ordinary skill in the art to take the image sensing apparatus disclosed by Tschudi and combine with it the sensing apparatus taught by Puttkammer. The suggestion/motivation for doing so would have been to provide a single image pickup plate with reduced capacitive coupling between electrodes." *See* Office Action, page 13.

It is Applicant's understanding that the Office Action asserts that one of skill in the art would have been motivated to modify the fingerprint sensor of Tschudi by replacing its sensor array with the scanner disclosed by Puttkammer. The Office Action asserts that such a modification is suggested by Puttkammer at lines 1-9 of paragraph 24 and contends that the modification would provide a single image pickup plate and reduced capacitive coupling between electrodes.

The cited portion Puttkammer states that, "[c]ompared to sensors with large-surface electrodes, the scanner with its smaller electrode surfaces offers the advantage of reduced

capacitive coupling between individual electrodes." Puttkammer further indicates that, "[i]n the present embodiment the resolution, in the longitudinal as well as transverse directions, is one scannable dot per mm." *See* Puttkammer, paragraph 43, lines 15-17.

However, Tschudi discloses that, "[t]o measure the structures in a fingerprint, the array [of sensors] will typically be 10-15 mm long with a resolution of 50 μm. This is difficult to obtain using a single line of sensors." *See* Tschudi, column 3, lines 4-7. Because the sensor array of Tschudi already uses smaller electrode surfaces (sensors with a resolution of 50 μm) than those of Puttkammer (which provide a resolution of 1 scannable dot per mm), one of skill in the art would not have modified Tschudi to replace the sensor array with the scanner of Puttkammer to provide smaller electrode surfaces to reduce capacitive coupling between individual electrodes.

Further, Tschudi expressly teaches away from using the scanner of Puttkammer in its fingerprint sensor. As discussed above, Tschudi discloses that a resolution fine enough to measure structures in a fingerprint is difficult to achieve with a single line of sensors. *See* Tschudi, column 3, lines 4-7. The scanner of Puttkammer has a single line of sensors (i.e., transmitting electrodes 9) intended for detecting electrically conductive dyes in documents. The above-cited passage of Tschudi indicates that such a scanner would not provide a fine enough resolution for detecting fingerprints. Thus, one of skill in the art would not have been motivated to use the scanner of Puttkammer in the fingerprint sensor of Tschudi.

Thus, for the reasons discussed above, the combination of Tschudi and Puttkammer is improper. Accordingly, it is respectfully requested that the rejection of claims 35, 39, 40, 45-51, 64, 68, and 71 under 35 U.S.C. §103 as purportedly being obvious over Tschudi in view of Puttkammer be withdrawn.

The Claims Patentably Distinguish Over The Combination

Assuming, *arguendo*, that one of skill in the art would have been motivated to modify Tschudi to replace the sensor array with the scanner of Puttkammer, independent claim 35 patentably distinguishes over the combination.

Claim 35

Claim 35 is directed to a fingerprint sensing system comprising: an image sensor comprising an array of capacitive sensors for capacitive sensing of ridge peaks and ridge valleys of a fingerprint on a moving finger, said image sensor comprising: an image pickup plate disposed generally laterally with respect to a direction of movement of the finger; and a plurality of image drive plates in spaced relation to said image pickup plate to define a plurality of sensor gaps between respective image drive plates and said image pickup plate, wherein ridge peaks and ridge valleys of the fingerprint passing over said sensor gaps produce a change in capacitance between respective image drive plates and said image pickup plate; a finger sensor for sensing a speed of the finger as it moves across said image sensor; and a sensor circuit for excitation of said image sensor with image drive signals and for detection of image signals in response to said image drive signals, for excitation of said finger sensor with finger drive signals and for detection of finger signals in response to said finger drive signals, and for coordinating said image signals and said finger signals to provide a fingerprint image.

Neither Tschudi or Puttkammer discloses or suggests "a finger sensor for sensing a speed of the finger as it moves across said image sensor" or "a sensor circuit... for excitation of said finger sensor with finger drive signals and for detection of finger signals in response to said finger drive signals," as required by claim 35.

The Office Action asserts that Tschudi discloses these limitations at column 3, lines 34-40 and column 4, lines 15-20. Applicant respectfully disagrees. The cited passages of Tschudi disclose that the velocity of a swiped finger is determined by correlating signals generated by the sensor arrays. That is, Tschudi does not disclose a separate finger sensor for sensing a speed of the finger as it moves across the image sensor. Rather, the system of Tschudi includes only arrays of sensors that are used to detect fingerprint features (e.g., arrays 40, 41, and 42 in Figure 4). The speed of a swiped finger is not detected using a finger sensor and a sensor circuit that excites the finger sensor with drive signals and detects the finger signals in response to said finger drive signals. Rather, the speed of the swiped finger is determined by performing post-swipe signal processing on signals that represent fingerprint features generated by the sensor arrays. Indeed, Tschudi discloses that, "[t]he velocity may be found by correlating similar

features measured at different times at different sensor elements" and that, "the distance between the sensor arrays and correlating of the signals to find the tame lapse between the passing of the same features, may be used to find the velocity of the finger drawn through the fingerprint sensor." *See* Tschudi, column 3, lines 34-40 and column 4, lines 15-20. Puttkammer does not cure this infirmity of Tschudi, as Puttkammer is not concerned determining the velocity of documents passed through the scanner because the vertical position of documents passed through the scanner does not affect examination of the document. *See* Puttkammer, Figure 1 and paragraph 40, lines 1-10.

Thus, claim 35 patentably distinguishes over Tschudi and Puttkammer, whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 35 under 35 U.S.C. §103(a) be withdrawn.

Claims 36-66, 71, and 72 depend from claim 35 and are patentable for at least the same reasons. Accordingly, it is respectfully requested that the rejection of these claims be withdrawn.

Rejections over Borza and Tschudi

The Office Action rejects claim 79 under 35 U.S.C. §103(a) as purportedly being unpatentable over Borza (6,333,989) in view of Tschudi. Applicant respectfully disagrees with this rejection as the combination of Borza and Tschudi is improper. Further, even if one were to combine Borza and Tschudi in the manner suggested in the Office Action, claim 79 patentably distinguishes over any such combination.

The Combination of Borza and Tschudi Is Improper

The Office Action asserts that, "[a]t the time of the invention, it would have been obvious to a person of ordinary skill in the art to take the finger sensor for detecting movement or motion of a finger as disclosed by Borza and use the technique of [*sic*] find the time elapsed between detecting correlated features to determine the speed of the moving finger as taught by Tschudi. The suggestion/motivation for doing so would have been for combining multiple pictures of portions of the fingerprint to create a composite picture."

Applicant respectfully disagrees that one of skill in the art would have modified Borza to use the correlation techniques of Tschudi to determine the speed of the moving finger. The Office Action asserts that the motivation for doing so would be to permit the combining of multiple images of portions of a fingerprint to create a composite image of the fingerprint. However, the system of Borza, without such a modification, already generates a composite image from multiple images of portions of a fingerprint. Thus, there would be no need to incorporate the techniques of Tschudi to accomplish this task. Indeed, Borza discloses that if the spatial relationship between stored images is known, then images may be stored in the proper location in the image space to generate the composite fingerprint image. If the spatial relationship is not known, the image portion is stored for later reference and another portion of the fingertip is imaged. *See* Borza, column 8, line 50 – column 9, line 7; and Figure 6.

That is, Borza creates a composite image using known spatial distances between images, rather than determining the velocity of the swiped finger. Borza discloses two sensing pads that are a known distance apart from each other. The swiped finger is scanned at each of these two sensing pads. The known spatial distance is determined by scanning the finger at a first sensing pad and at a subsequent second sensing device, which are a known distance, Δd, apart from each other. When the sensed fingerprint data at the second sensing pad is substantially the same as fingerprint data previously sensed at the first fingerprint pad, the fingertip is known to have moved the distance Δd. *See* Borza, column 6, lines 35-49.

Thus, in the system of Borza there is no need to determine the velocity of the fingertip as it moves across the sensor because the system of Borza determines spatial distances between images and uses these distances to create a composite image of the fingertip. Therefore, one of skill in the art would not have been motivated to modify Borza to use the velocity determining techniques of Tschudi because there is simply no need to do so.

The Claims Patentably Distinguish Over The Combination

Assuming, *arguendo*, that one of skill in the art would have been motivated to modify Borza to employ the velocity determining techniques of Tschudi, claim 79 nevertheless patentably distinguishes over the combination.

Claim 79

Claim 79 is directed to a fingerprint sensing system comprising: an image sensor comprising an array of capacitive sensors for capacitive sensing of ridge peaks and ridge valleys of a fingerprint on a moving finger; a finger sensor for sensing the speed of a finger as it moves across said image sensor, wherein said image sensor and said finger sensor are fabricated on a single substrate; and a sensor circuit, separate from said substrate, for operating said image sensor and said rate sensor to provide fingerprint data.

Neither Borza nor Tschudi discloses or suggests that the image sensor and the finger sensor are fabricated on a single substrate and that the sensor circuit is separate from the substrate. Borza is silent as to whether the first sensing pad and the second sensing pad are fabricated on the same substrate and is also silent as to whether the signal processing circuitry that constructs a composite fingerprint image is separate from the sensing pads or is on the same substrate as the first sensing pad and/or second sensing pad. Tschudi does not cure this infirmity of Borza.

Thus, claim 79 patentably distinguishes over Borza and Tschudi whether taken alone or in combination. Accordingly, it is respectfully requested that the rejection of claim 79 under 35 U.S.C. §103(a) be withdrawn.

Claims 80 and 81 depend from claim 79 and are patentable for at least the same reasons. Accordingly, it is respectfully requested that the rejection of claims 80 and 81 be withdrawn.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,

Fred G. Benkley, III, Applicant

By: William R. McClellan

William R. McClellan, Reg. No. 29,409
Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2211
Telephone: (617) 720-3500

Docket No. M1059.70000US00
Date: January 9, 2006
x1/13/06x